



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) **EP 0 822 430 A3**

(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:
28.04.1999 Bulletin 1999/17

(51) Int. Cl.⁶: **G02B 6/42**, G02B 6/12,
B28D 5/02

(43) Date of publication A2:
04.02.1998 Bulletin 1998/06

(21) Application number: **97113008.3**

(22) Date of filing: **29.07.1997**

(84) Designated Contracting States:
**AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC
NL PT SE**
Designated Extension States:
AL LT LV RO SI

- **Hikita, Makoto**
Mito-shi, Ibaraki (JP)
- **Tomaru, Satoru**
Mito-shi, Ibaraki (JP)
- **Imamura, Saburo**
Mito-shi, Ibaraki (JP)
- **Usui, Mitsuo**
Tokyo (JP)
- **Katsura, Kosuke**
Hachioji-shi, Tokyo (JP)

(30) Priority: **31.07.1996 JP 202275/96**
27.02.1997 JP 43606/97

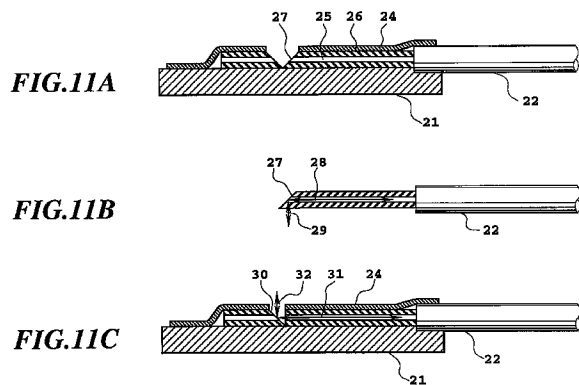
(71) Applicant:
**NIPPON TELEGRAPH AND TELEPHONE
CORPORATION**
Shinjuku-ku, Tokyo 163-19 (JP)

(74) Representative:
Leson, Thomas Johannes Alois, Dipl.-Ing. et al
Patentanwälte
Tiedtke-Bühling-Kinne & Partner,
Bavariaring 4
80336 München (DE)

(72) Inventors:
• **Yoshimura, Ryoko**
Hitachinaka-shi, Ibaraki (JP)

(54) **Waveguide optical deflector, process for producing the same, and saw blade for use in this process**

(57) The method of the invention comprises forming an optical deflector in a planar optical waveguide or an optical fiber type optical waveguide by perpendicularly moving a blade (40) having a blade tip with an angle of inclination against the optical waveguide at a desired location thereof to form an oblique end face (6,9) usable as an oblique end face mirror. The invention also includes the blade used in the method and an optical deflector formed by the method, in which the oblique face (9) and the waveguide end face (9a,52) form a V-groove, the waveguide end face (9a,52) being inclined slightly to the perpendicular to the waveguide optical axis, or the V-groove being filled with a substance (70) having a refractive index close to that of the waveguide core (3).



EP 0 822 430 A3



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 97 11 3008

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	PATENT ABSTRACTS OF JAPAN vol. 012, no. 470 (P-798), 9 December 1988 & JP 63 191111 A (NIPPON TELEGR & TELEPH CORP), 8 August 1988 * abstract; figures 1,3 *	1,2,7-9	G02B6/42 G02B6/12 B28D5/02
Y	---	3-6, 10-16	
Y	PATENT ABSTRACTS OF JAPAN vol. 004, no. 149 (P-032), 21 October 1980 & JP 55 098713 A (HITACHI LTD), 28 July 1980 * abstract *	3-6	
Y	PATENT ABSTRACTS OF JAPAN vol. 008, no. 055 (P-260), 13 March 1984 & JP 58 205117 A (HITACHI SEISAKUSHO KK), 30 November 1983 * abstract *	3-6	
X	DE 44 02 166 A (DAIMLER BENZ AG) 10 November 1994 * column 3, line 1 - line 18; figure 1 *	17-20, 22-24, 32-38	TECHNICAL FIELDS SEARCHED (Int.Cl.6) G02B B28D
Y	---	21,25-31	
Y	EP 0 420 592 A (NIPPON TELEGRAPH & TELEPHONE) 3 April 1991 * claims 1-12 *	10-16, 25-29	
Y	DATABASE WPI Section Ch, Week 8950 Derwent Publications Ltd., London, GB; Class A88, AN 89-367406 XP002095002 & JP 01 274966 A (TOKYO JIKI INSATSU KK) , 2 November 1989 * abstract *	21,42	
	-/--		
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
MUNICH		1 March 1999	Lord, R
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document	

EPO FORM 1503 03 82 (P04C01)



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 97 11 3008

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
Y	PATENT ABSTRACTS OF JAPAN vol. 011, no. 377 (M-649), 9 December 1987 & JP 62 148159 A (NIPPON SEIKO KK;OTHERS: 01), 2 July 1987 * abstract *	21,42	
Y	----- PATENT ABSTRACTS OF JAPAN vol. 010, no. 140 (P-458), 23 May 1986 & JP 60 260904 A (MITSUBISHI RAYON KK), 24 December 1985 * abstract *	30,31	
Y	----- EP 0 486 206 A (AMERICAN TELEPHONE & TELEGRAPH) 20 May 1992 * the whole document *	30,31	
X	----- EP 0 678 904 A (LSI LOGIC CORP) 25 October 1995 * column 5, line 12-36; figures 5A,5B *	39-41	
Y	----- * column 2, line 48 - line 58 *	42	
X	----- PATENT ABSTRACTS OF JAPAN vol. 016, no. 299 (M-1274), 2 July 1992 & JP 04 082670 A (KANTOU RIKA KOUGIYOU KK), 16 March 1992 * abstract *	39-41	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
Place of search		Date of completion of the search	Examiner
MUNICH		1 March 1999	Lord, R
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone		T : theory or principle underlying the invention	
Y : particularly relevant if combined with another document of the same category		E : earlier patent document, but published on, or after the filing date	
A : technological background		D : document cited in the application	
O : non-written disclosure		L : document cited for other reasons	
P : intermediate document		& : member of the same patent family, corresponding document	

EPO FORM 1503 03.82 (P04C01)